

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 10/509,601
Attorney Docket No.: Q83766

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A progressive multifocal lens for correcting eyesight comprising:
~~having a progressive refracting interface, said in a progressive refracting interface is located on the a side of an eyeball or a refracting interface on the a side of an object, wherein the progressive refracting interface including comprises:~~
a distance portion, and
a near portion with different refractive powers, and
a progressive portion of which refractive power varies progressively therebetween,
~~wherein the progressive multifocal lens is characterized in that the eyeball-side refracting interface or the object-side refracting interface is a combined refracting interface composed of comprising an original progressive refracting interface set only to exhibit a desired eyesight corrective characteristic and an original toric surface set only to exhibit a desired astigmatism corrective characteristic, and~~
~~wherein, when the z-axis is an axis passing through the center of the progressive refracting interface from the object toward the eyeball, the x-axis is the cylinder axis of the original toric surface, and the y-axis is an axis perpendicular to the x-axis and the z-axis, value z_p~~

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in any point P (x_p , y_p , z_p) in the combined refracting interface is expressed by a first expression (1) or a second expression (2) by using the approximate curvature C_p of the original progressive refracting interface, curvature C_x in the x-axis direction, and curvature C_y in the y-axis direction,

wherein the first expression (1) is expressed as [Numerical Formula 1]

$$z_p = \frac{(c_p + c_x)x^2 + (c_p + c_y)y^2}{\sqrt{1 - \frac{((c_p + c_x)x^2 + (c_p + c_y)y^2)^2}{x^2 + y^2}}} \dots (1) \text{ and}$$

wherein the second expression (2) is expressed as

[Numerical Formula 2]

$$z_p = \frac{(c_p + c_x)x^2}{1 + \sqrt{1 - (c_p + c_x)^2(x^2 + y^2)}} + \frac{(c_p + c_y)y^2}{1 + \sqrt{1 - (c_p + c_y)^2(x^2 + y^2)}} \dots (2)$$

2. (currently amended) A progressive multifocal lens according to claim 1, characterized in that wherein an the eyeball-side refracting interface surface or the an object-side refracting interface surface opposite to the surface having the combined refracting interface is spherical or rotation-symmetry aspherical in shape.

3. (currently amended) A method for designing a progressive multifocal lens for correcting eyesight having a progressive refracting interface in a refracting interface on the a side of an eyeball or on a side a refracting interface on the side of an object, the progressive refracting interface including comprising a distance portion, and a near portion with different refractive

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powers, and a progressive portion of which refractive power varies progressively therebetween, wherein the method is characterized by comprising:

~~a first step of~~ obtaining an original progressive refracting interface only in order that the eyeball-side refracting interface or the object-side refracting interface exhibits an eyesight corrective characteristic;

~~a second step of~~ obtaining an original toric surface only in order that the eyeball-side refracting interface or the object-side refracting interface exhibits a desired astigmatism-corrective characteristic; and

~~a third step of~~ obtaining a combined refracting interface as the eyeball-side refracting interface or the object-side refracting interface, the combined refracting interface being composed of comprising the original progressive refracting interface set only to exhibit a desired eyesight corrective characteristic and the original toric surface set only to exhibit a desired astigmatism corrective characteristic,

-wherein in the third step obtaining of the combined refracting interface, when the z-axis is an axis passing through the center of the progressive refracting interface from the object toward the eyeball, the x-axis is the cylinder axis of the original toric surface, and the y-axis is an axis perpendicular to the x-axis and the z-axis, value z_p in any point P (x_p, y_p, z_p) in the combined refracting interface is obtained by a first expression (1) or a second expression (2) by using the an approximate curvature C_p of the original progressive refracting interface, a curvature C_x in the x-axis direction, and a curvature C_y in the y-axis direction,-

wherein the first expression (1) is expressed as [Numerical Formula 3]}

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$$z_p = \frac{(c_p + c_x)x^2 + (c_p + c_y)y^2}{\sqrt{1 - \frac{((c_p + c_x)x^2 + (c_p + c_y)y^2)^2}{x^2 + y^2}}} \quad \dots (1)$$

[Numerical Formula 4] wherein the second expression (2) is expressed as

$$z_p = \frac{(c_p + c_x)x^2}{1 + \sqrt{1 - (c_p + c_x)^2(x^2 + y^2)}} + \frac{(c_p + c_y)y^2}{1 + \sqrt{1 - (c_p + c_y)^2(x^2 + y^2)}}.$$

4. (new): The progressive multifocal lens according to claim 1, wherein, the value z_p in any point P (x_p, y_p, z_p) in the combined refracting interface is expressed by the second expression (2).

5. (new): The progressive multifocal lens according to claim 1, wherein the object-side has the combined refracting interface and the eyeball-side surface is spherical in shape.

6. (new): The progressive multifocal lens according to claim 1, wherein an eyeball-side refracting interface surface or an object-side refracting interface surface opposite to the surface having the combined refracting interface is rotation-symmetry aspherical in shape.

7. (new): The method for designing a progressive multifocal lens according to claim 3, wherein the original toric surface is obtained by a third expression expressed as:

$$z = \frac{c_x x^2 + c_y y^2}{1 + \sqrt{1 - \frac{(c_x x^2 + c_y y^2)^2}{x^2 + y^2}}}, \text{ wherein } z \text{ represents a circular arc of the original toric surface.}$$

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8. (new): The method for designing a progressive multifocal lens according to claim 3, wherein the original toric surface is obtained by a fourth expression expressed as:

$$z = \frac{c_x x^2}{1 + \sqrt{1 - c_x^2 (x^2 + y^2)}} + \frac{c_y y^2}{1 + \sqrt{1 - c_y^2 (x^2 + y^2)}},$$
 wherein z represents a circular arc of the original toric surface.